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National Estuary Program: A Collaborative Approach to Protecting Coastal Water Quality

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David M. Bearden
Environmental Information Analyst
Resources, Science, and Industry Division

National Estuary Program: A Collaborative Approach to Protecting Coastal Water Quality

Summary

Estuaries are coastal bays or rivers and their freshwater tributaries. These waterways provide resources for diverse uses including commerce, public infrastructure, and recreation. The Clean Water Act Amendments of 1987 (P.L. 100-4) established the National Estuary Program to identify nationally significant estuaries that are threatened by pollution, land development, or overuse, and to award grants that support the development of comprehensive management plans to restore and protect them. State governors can nominate estuaries within their states to be admitted into the National Estuary Program, and a total of 28 estuaries have been admitted thus far. The Environmental Protection Agency (EPA) collaborates with other federal agencies, state and local governments, non-profit institutions, industry, and citizens to address an estuary's environmental problems.

Appropriations for the National Estuary Program have ranged from an initial funding level of \$11.1 million in FY1987 to a high of \$17.9 million in FY1992. The current funding level for FY2001 is \$13.8 million, the same amount as enacted for FY2000. The Clean Water Act Amendments of 1987 originally authorized funding for the National Estuary Program through FY1991, but Congress continued to fund it through FY2000 without enacting reauthorizing legislation. The 106th Congress enacted the Estuaries and Clean Waters Act of 2000 (P.L. 106-457), which reauthorized the program at \$35 million annually from FY2001 to FY2005. The law also amended the Clean Water Act to allow funding to be used for implementing as well as developing estuary management plans.

Apart from the National Estuary Program, P.L. 106-457 also authorized a total of \$275 million in matching funds from FY2001 to FY2005 for a new estuary habitat restoration program to be carried out by the Army Corps of Engineers. The goal of the program is to restore 1 million acres of estuary habitat by 2010. It would be a new potential source of funding for implementing approved management plans under the National Estuary Program. However, the total funding level of \$275 million is an authorized amount, which still must be appropriated by Congress before it would become available.

While geographic and demographic factors differ among estuaries in the National Estuary Program, many of them share the following environmental problems: eutrophication, contamination from toxic substances and pathogens, habitat loss, altered freshwater inflows, and endangered and non-native species. Common sources of these problems include industrial pollution, wastewater overflows, stormwater and agricultural runoff, waste from boaters and swimmers, land development, and freshwater diversion. EPA has approved the management plans for 22 estuaries in the National Estuary Program, and many interests are working together to address the above environmental problems. While the program's collaborative nature offers flexibility, achieving results can require significantly more time than instituting conventional regulatory measures. Its long-term success will depend on the continued participation, commitment, and resources of the stakeholders in each locality.

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National Estuary Program: A Collaborative Approach to Protecting Coastal Water Quality

Introduction

The Clean Water Act Amendments of 1987 (P.L. 100-4) established the National Estuary Program to identify nationally significant estuaries that are threatened by pollution, land development, or overuse, and to award grants that support the development of comprehensive management plans to restore and protect them.¹ The Estuaries and Clean Waters Act of 2000 (P.L. 106-457) reauthorized the program through FY2005 and amended the Clean Water Act to allow funding to be used for implementing such plans in addition to developing them. The Environmental Protection Agency (EPA) works with federal agencies, state and local governments, non-profit institutions, industry, and citizens to address an estuary's environmental problems. Experience from past federal efforts were instrumental in the creation of the National Estuary Program. The Chesapeake Bay and Great Lakes programs have been studying water quality since the 1970s, and EPA and the National Oceanic and Atmospheric Administration (NOAA) jointly studied water quality in six estuaries from 1985 to 1987 that are now part of the National Estuary Program.²

The land draining into an estuary is its watershed, and the activities that occur within it can affect water quality. The National Estuary Program is a watershed approach in which all affected interests participate in creating solutions that balance environmental objectives with competing issues. A watershed approach strives to manage the water resources of a specific geographic area as opposed to federally regulating certain sources of pollution uniformly. While this approach offers the flexibility to design solutions within the context of local needs, stakeholders must participate in the process and commit their time and resources for it to succeed.

This report is based on 11 of the 28 estuaries that are currently in the National Estuary Program which represent common environmental problems along the nation's coastline: on the Pacific Coast, the Columbia River, Puget Sound, San Francisco Bay, and Santa Monica Bay; on the Atlantic Coast, Albemarle-Pamlico Sound, Long Island

¹ Estuaries are coastal bays or rivers and their freshwater tributaries. Because the concentration of environmental problems is different in each locality, the extent of the waterways and size of the land area that define each estuary in the National Estuary Program vary. Consequently, the boundaries of some estuaries in the program are broader and further inland than others.

² EPA administers separate programs under sections 117 and 118 of the Clean Water Act to address environmental problems in Chesapeake Bay and the Great Lakes.

Sound, Narragansett Bay, and Maryland's coastal bays (excluding Chesapeake Bay); and on the Gulf of Mexico, Charlotte Harbor, Corpus Christi Bay, and Sarasota Bay.³

Why Should We Protect Estuaries?

Estuaries provide resources for diverse uses that many sectors of the public value. However, overuse and improper management can degrade water quality and limit an estuary's productive capacity. In Section 320 of the Clean Water Act, Congress stated that long-term planning and management are necessary to sustain the productivity of estuaries and maximize their utility to the nation.

Estuaries support many commercial activities. The shipping industry is a large source of employment and is an integral part of the national economy. For example, the states of Oregon and Washington report that ports in the Columbia River employ 2.6 million people and that more than 30% of the wheat exported from the United States is shipped from these ports.⁴ According to the management conference for Corpus Christi Bay, the tourism industry has grown substantially in recent years, and from 1989 to 1993, tourism expenditures in the bay area increased 41% and related jobs by 26%.⁵ Additionally, land development in response to the needs of rapidly growing populations has expanded the local economies of many estuaries in the National Estuary Program.

Coastal populations depend on water drawn from an estuary's freshwater tributaries to support public infrastructure such as drinking water and water supplies for industrial facilities, wastewater treatment plants, and irrigation. For example, the San Francisco Estuary Project, a state agency, estimates that San Francisco Bay's freshwater tributaries supply 55% of California's managed water supply and 40% of its drinking water for residents of San Francisco, East Bay cities, Stockton, Sacramento, and southern California.⁶ Diverted freshwater also has helped to turn the semi-arid land of central California into a productive agricultural area.

Estuaries provide recreation for coastal residents and visitors, and the state of Connecticut reports that recreation alone exceeds all other uses in Long Island Sound.⁷ Beaches attract swimmers, surfers, and sunbathers, and the management conference for Santa Monica Bay estimates that 45 million people visit the bay's 22

³ CRS contacted the program director of each estuary in the National Estuary Program to compile data on the status of the program, and selected 11 estuaries for inclusion in this report to provide a balanced geographic representation of the nation's coastline.

⁴ Office of the Governor. States of Oregon and Washington. The Nomination of the Lower Columbia River to the National Estuary Program. January 1995. p. 2-16.

⁵ Corpus Christi Bay National Estuary Program. Coastal Bend Bays and Estuaries: The Changing Face of a Landscape. September 1996. p. 18.

⁶ San Francisco Estuary Project. Sacramento/San Joaquin Delta. September 1995. p. 2.

⁷ University of Connecticut Cooperative Extension System and Connecticut Sea Grant College Program. Sea Grant Marine Advisory Program. Sound Values Fact Sheet.

public beaches each year.⁸ Many estuaries in the National Estuary program provide habitat for migratory birds, offering unique opportunities for birdwatchers. In addition, sport fishing and boating are popular activities at every estuary.

How Does the National Estuary Program Function?

Congress established the National Estuary Program in Section 320 of the Clean Water Act. This section of the law discusses the scope and administration of the program, criteria for admitting an estuary, federal programs to gather coastal water quality data, and grants for developing and implementing comprehensive management plans to restore and protect water quality. State governors can nominate any estuary lying entirely or partially within their states to be included in the National Estuary Program. The nomination must describe why EPA should admit the estuary into the program, propose a management conference to develop a plan for restoring and protecting water quality, indicate the likelihood of the plan's success (including possible sources of funding), and explain the estuary's national significance. Factors that determine whether an estuary is nationally significant include its geographic scope, the economic and social value of its uses to the nation, and whether its environmental problems are of national concern. EPA can accept the nomination if existing pollution control measures are insufficient to achieve or maintain water quality necessary for protecting fishery populations and sustaining public uses.⁹

To date, EPA has admitted a total of 28 estuaries that state governors have nominated for inclusion in the National Estuary Program. Congress granted priority consideration to 16 of these estuaries, and EPA has included 12 others that also meet the necessary criteria discussed above. The Estuaries and Clean Waters Act of 2000 (P.L. 106-457) amended Section 320 of the Clean Water Act to award priority consideration to the Lake Pontchartrain Basin in Louisiana and Mississippi. While this estuary has not been formally admitted into the National Estuary Program to date, it will likely be included in the future since EPA has admitted each estuary to which Congress has granted priority consideration.

Once an estuary is admitted into the program, a management conference characterizes the environmental problems and develops a Comprehensive Conservation and Management Plan to restore and protect water quality. These plans are subject to EPA's approval prior to implementation. Management conferences represent diverse interests including: EPA and other federal agencies, state and local governments, non-profit institutions, industry, and citizens. Management conferences use water quality data from federal, state, and local agencies to develop their management plans. Each conference forms a Science and Technical Advisory Committee to recommend new research if existing data is insufficient to characterize

⁸ Santa Monica Bay Restoration Project. Summary of the Bay Restoration Plan. December 1994. p. 12.

⁹ While water quality is poor enough to warrant corrective actions in nearly every estuary in the National Estuary Program, Charlotte Harbor on the Gulf of Mexico is relatively free of pollution. EPA admitted it primarily for the purpose of preservation to develop measures that would prevent environmental problems before they occur.

environmental problems. The Clean Water Act requires management conferences to complete their plans within 5 years, but EPA can extend this deadline if the environmental problems warrant it. A state agency usually coordinates implementation.

The Clean Water Act authorizes EPA to award grants that match up to 75% of the costs to develop an estuary's management plan, and the remaining 25% must come from non-federal sources. Grants were not originally authorized for implementation projects since the initial focus of the program was on providing federal assistance to state and local governments so that they could design their own plans to restore water quality and develop tailored solutions, rather than rely on federal regulation for corrective action. However, in response to concerns expressed by various stakeholders that full implementation of each estuary's management plan would not be possible without additional federal assistance, Congress amended Section 320 of the Clean Water Act under P.L. 106-457 to allow the use of grants for implementation. While grants for developing an estuary's management plan may cover up to 75% of a project's cost, grants for implementation projects must not exceed 50% of the cost, and the other 50% must come from non-federal sources.

Apart from National Estuary Program grants, there are three potential sources of federal funding that are available for implementation. First, capitalization grants under Section 319 of the Clean Water Act may be used for controlling nonpoint source pollution in navigable waters where existing measures are insufficient to achieve or maintain federal water quality standards. Second, states receive federal funds to develop Water Pollution Control State Revolving Funds, which may be used to implement applicable measures under an estuary's management plan. However, these funds are loans that the recipient must repay to the state. Third, P.L. 106-457 authorized a total of \$275 million from FY2001 to FY2005 in matching funds for a new estuary habitat restoration program to be carried out by the Army Corps of Engineers, which has the goal of restoring 1 million acres of estuary habitat by 2010. However, the funding levels for this new program are authorized amounts, which still must be appropriated by Congress before they would become available. Despite the availability of these potential sources, federal funding for implementation is limited. Consequently, the long-term success of each estuary's management plan will depend on the commitment and financial resources of the stakeholders. **Table 1**, below, lists each estuary in the National Estuary Program and indicates the status of its comprehensive management plan.

Table 1. Status of the National Estuary Program as of January 2001

Estuary	State	Entry	Plan Status
Puget Sound a, b	Washington	1987	Implementation
Buzzards Bay a, b	Massachusetts	1987	Implementation
Narragansett Bay a, b	Rhode Island	1987	Implementation
Long Island Sound a, b	Connecticut, New York	1987	Implementation
Albemarle-Pamlico Sound a, b	North Carolina	1987	Implementation
San Francisco Bay a, b	California	1987	Implementation

Estuary	State	Entry	Plan Status
New York-New Jersey Harbor a	New York, New Jersey	1988	Implementation
Delaware Inland Bays a	Delaware	1988	Implementation
Santa Monica Bay a	California	1988	Implementation
Sarasota Bay a	Florida	1988	Implementation
Galveston Bay a	Texas	1988	Implementation
Delaware Estuary a	Delaware, Pennsylvania, New Jersey	1988	Implementation
Casco Bay	Maine	1990	Implementation
Massachusetts Bays a	Massachusetts	1990	Implementation
Indian River Lagoon a	Florida	1990	Implementation
Tampa Bay	Florida	1990	Implementation
Barataria-Terrebonne Complex a	Louisiana	1990	Implementation
Corpus Christi Bay	Texas	1993	Implementation
Peconic Bay a	New York	1993	Development
San Juan Bay	Puerto Rico	1993	Implementation
Tillamook Bay	Oregon	1993	Implementation
New Hampshire Estuaries	New Hampshire	1995	Development
Barneгат Bay	New Jersey	1995	Pending
Maryland Coastal Bays c	Maryland	1995	Implementation
Charlotte Harbor	Florida	1995	Pending
Mobile Bay	Alabama	1995	Development
Morro Bay	California	1995	Pending
Lower Columbia River	Oregon, Washington	1995	Implementation

a Congress awarded priority consideration to these estuaries under section 320 of the Clean Water Act.

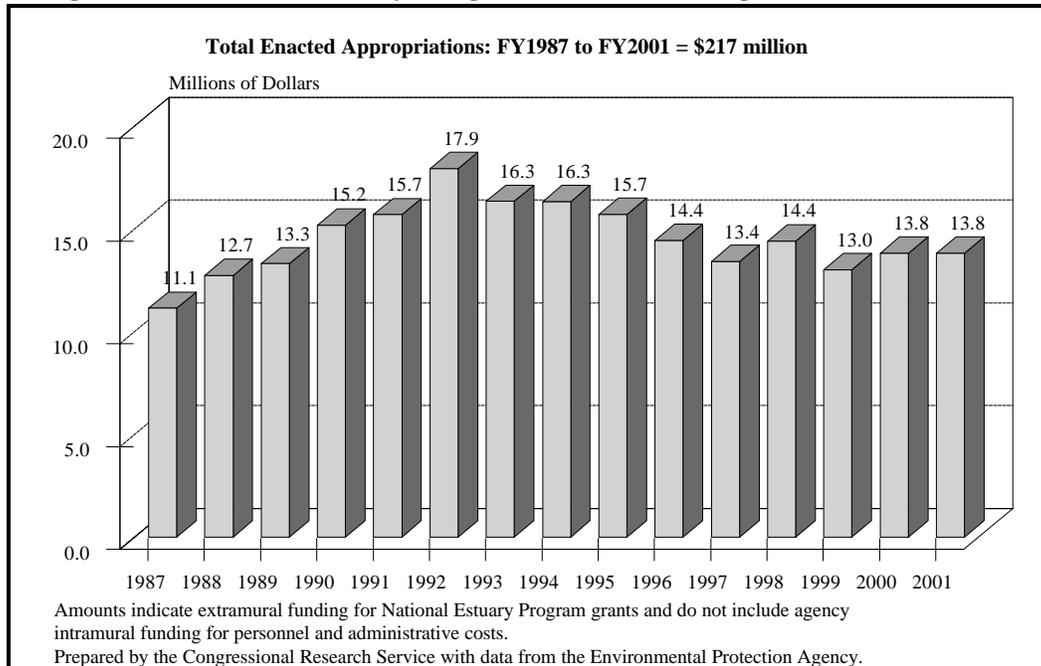
b EPA and NOAA studied water quality in these estuaries from 1985 to 1987.

c The Maryland Coastal Bays program does not include the Chesapeake Bay. Under section 117 of the Clean Water Act, EPA administers a separate federal program to address its environmental problems.

Prepared by the Congressional Research Service with data from the Environmental Protection Agency.

Appropriations

Under the Clean Water Act Amendments of 1987, Congress originally authorized appropriations of \$12 million annually from FY1987 to FY1991 to administer the National Estuary Program, award grants to develop estuary management plans, monitor their implementation, and support estuarine research. P.L. 106-457 reauthorized the National Estuary Program at \$35 million annually from FY2001 to FY2005, and as discussed earlier on page 4, authorized the use of grants for implementing estuary management plans in addition to developing them. However, this annual funding level of \$35 million is only an authorized amount, and still must be appropriated by Congress before it would become available. As indicated in **Figure 1** on the following page, Congress has appropriated a total of \$217 million for National Estuary Program grants from FY1987 to FY2001. Annual appropriations have ranged from an initial level of \$11.1 million in FY1987 to \$17.9 million in FY1992. The current funding level for FY2001 is \$13.8 million, the same amount as enacted for FY2000.

Figure 1. National Estuary Program Grant Funding: FY1987 to FY2001

What Are the Common Environmental Problems?

While geographic and demographic factors differ among estuaries in the National Estuary Program, many of them share the following environmental problems: eutrophication, contamination from toxic substances and pathogens, habitat loss, altered freshwater inflows, and endangered and non-native species. Common sources of these problems include releases of pollutants from industrial facilities and wastewater treatment plants, runoff from stormwater and agricultural land, and discharges of waste from boaters and swimmers. Developing land and diverting freshwater also can alter habitats and potentially threaten fishery and wildlife populations.

Eutrophication

Eutrophication is a process in which excessive plant growth on the water's surface lowers oxygen levels and prevents sunlight from penetrating the water, which can threaten fishery populations and their habitat. Fertilizers and inadequately treated sewage often contain phosphorous and nitrogen that can act as nutrients to stimulate excessive plant growth. Runoff from the land and overflows from wastewater treatment plants can release nutrients into waterways. Eutrophication threatens water quality in many estuaries. For example, the management conference for Maryland's coastal bays reports that eutrophication is the most pervasive environmental problem facing the estuary and that it is most severe in areas where discharges of nutrients from agricultural runoff and malfunctioning septic systems are extensive.¹⁰

¹⁰ Maryland Coastal Bays Program. Management Conference Agreement. June 1996. p. 4.

Toxic Substances

Toxic substances can cause disease in wildlife and damage their habitat, and consuming contaminated water or fish can pose a risk to public health. While industrial facilities are a potential source of toxic substances, other sources are less direct and more difficult to control, including runoff from stormwater and agricultural land and overflows from wastewater treatment plants. Toxic substances have been a persistent problem in Puget Sound, and many areas within its watershed are listed in the federal Superfund program to clean up hazardous waste sites.¹¹ Rainwater also is a potential source of toxic substances, as it can deposit air pollution directly into bays, rivers, and streams. For example, the management conference for Santa Monica Bay claims that air pollution from the Los Angeles area contributes to the level of contaminants in the bay and that restoring water quality may depend on continuing efforts to reduce air pollution.¹² Even if current releases of toxic substances were eliminated, sediments contaminated from historic discharges could continue to threaten water quality in many estuaries. According to the management conference for Narragansett Bay, toxic substances released from manufacturing industries 20 years ago continue to degrade the estuary's water quality today.¹³

Pathogens

Pathogens are bacteria, viruses, and parasites that can cause numerous human illnesses. Discharges of inadequately treated sewage from wastewater treatment plants and septic systems, agricultural runoff from land with farm animals, and releases of human waste from boaters and swimmers are potential sources of pathogens. To protect public health, states have periodically prohibited commercial fishing and closed beaches due to contaminated water at many of the estuaries in the National Estuary Program. During recent years, the state of Maryland has closed many areas of its coastal bays to commercial shell fishing due to detecting unsafe levels of fecal bacteria.¹⁴

Habitat Loss

Pollution, land development, and dredging operations to construct and maintain navigable waterways can deplete or significantly alter habitats, and depletion of wetlands is a common habitat problem facing many estuaries in the National Estuary Program. Loss of wetlands can restrict water circulation and lead to higher concentrations of pathogens, nutrients, toxic substances, and other pollutants. According to the management conference for Sarasota Bay, land development has altered 78% of the bay's native shoreline over the past 40 years, and sediments

¹¹ Puget Sound Water Quality Authority. 1994 Puget Sound Water Quality Management Plan. May 1994. p. 2-4.

¹² Santa Monica Bay Restoration Project. Summary of the Bay Restoration Plan. December 1994. p. 30.

¹³ Narragansett Bay Project. 1995 Biennial Report. p. 4.

¹⁴ Maryland Coastal Bays Program. Management Conference Agreement. June 1996. p. 5.

deposited from dredging operations during the 1950s and 1960s continue to cause habitat problems today.¹⁵

Altered Freshwater Inflows

Diverting freshwater from an estuary to provide public drinking water and maintain water supplies for irrigation, wastewater treatment plants, and industrial facilities can alter the water's salinity. If salinity rises above certain levels, aquatic populations that once thrived may no longer be able to survive in the saltier water. The management conference for Corpus Christi Bay reports that rapid population growth has increased the demand on public water supplies that depend on the bay's freshwater tributaries.¹⁶ Recent droughts in Texas have prompted debate over the increased need for diverting freshwater for human uses while attempting to preserve water quality.

Endangered Species

Many estuaries in the National Estuary Program provide necessary habitat for endangered species of animals and plants, and the management conferences consider measures to protect them when developing their plans. The states of Oregon and Washington report that the Columbia River historically has had the largest spawning runs of many salmon species in the world.¹⁷ However, these runs have greatly declined during the past 40 years, and spring and summer runs of chinook salmon in portions of the river are listed as endangered. The management conference for the Columbia River is in the process of developing its management plan and intends to include measures that would restore these fish runs.

Non-Native Species

Species of fish, other wildlife, and plants that are not native to an estuary can threaten native species by competing with them for habitat and elements in the food chain. Non-native species can enter an estuary when ships arriving from other geographic areas discharge ballast water from their hulls. For example, the San Francisco Estuary Project reports that an Asian clam in San Francisco Bay has multiplied from a few specimens found in 1986 to populations of 30,000 per square meter. The project estimates that this one species may have consumed enough of the bay's plankton to alter the balance of the food chain and potentially threaten native species that depend on the same resources.¹⁸

¹⁵ Sarasota Bay Project. State of the Bay Report. January 1990. p. 18-23.

¹⁶ Corpus Christi Bay National Estuary Program. Priority Problems List: Fact Sheet.

¹⁷ Office of the Governor. States of Oregon and Washington. The Nomination of the Lower Columbia River to the National Estuary Program. January 1995. p. 2-12 - 2-15.

¹⁸ San Francisco Estuary Project. San Francisco Bay-Delta Estuary. December 1993. p. 4.

What Has the National Estuary Program Accomplished?

As indicated in **Table 1** on page 4, EPA has approved the management plans for 22 of the 28 estuaries in the National Estuary Program. The management conferences for these estuaries have taken numerous actions to address the environmental problems discussed above and are following the watershed approach of managing water resources according to local needs. While this approach offers greater flexibility, achieving results can require significantly more time than instituting conventional regulatory measures. For example, public education is an integral part of most management plans, but convincing individuals to alter behavior that threatens water quality is an extensive and ongoing process. Since the National Estuary Program is a collaborative effort, its long-term success depends on the continued participation, commitment, and resources of each stakeholder. The following sections of this report provide examples of priority problems and corrective actions to restore and protect water quality in four estuaries that have been part of the National Estuary Program since its beginning in 1988: Puget Sound, San Francisco Bay, Albemarle-Pamlico Sound, and Long Island Sound.

Puget Sound

In 1991, Puget Sound became the first estuary in the National Estuary Program to have an approved management plan. The Puget Sound Water Quality Action Team, a state agency under the Office of the Governor of Washington, is coordinating its implementation, and the Administrator of EPA's Region 10 serves on the team as a non-voting member.¹⁹ Examples of priority problems and corrective actions include: reducing pollution from stormwater runoff, restoring habitats, monitoring water quality, and involving and educating the public.

Reducing Pollution from Stormwater Runoff. The state of Washington provides technical assistance to local governments for developing stormwater management programs.²⁰ Some municipalities have developed methods to treat stormwater runoff more effectively, and many businesses have implemented a variety of *best management practices* to treat and decrease runoff from their properties. Runoff from highways is difficult to control, and the Puget Sound Water Quality Action Team is coordinating a program to manage this potential source of pollutants, including oil, grease, and petroleum-based fuels.

Restoring Habitats. The Puget Sound Water Quality Action Team reports that land development around the estuary has altered critical habitats for many species of spawning fish and that improperly designed or maintained road crossings block roughly 3,000 miles of spawning habitats.²¹ The Washington Department of Fish and Wildlife is addressing this problem by providing technical assistance to local

¹⁹ Puget Sound Water Quality Action Team. Puget Sound Water Quality Work Plan: 1997-1999. January 1997. p. 1-5.

²⁰ Ibid., p. 94.

²¹ Ibid., p. 42.

governments for identifying road crossings that block fish from swimming upstream, restoring fish passages, and training volunteers.

Monitoring Water Quality. The U.S. Fish and Wildlife Service and the Washington Departments of Ecology, Fish and Wildlife, Health, and Natural Resources operate the Puget Sound Ambient Monitoring Program.²² These agencies are responsible for monitoring different sets of water quality data so that they do not duplicate their efforts. The monitoring program provides a comprehensive view of environmental problems across the entire estuary.

Involving and Educating the Public. The state of Washington's Public Involvement and Education Fund supports efforts that inform citizens and industry about the environmental problems in Puget Sound and foster uses that do not threaten water quality.²³ The fund has awarded more than \$4 million in grants for 280 projects that involved nearly 3 million people. For example, the Bainbridge Island School District has received a grant from the fund to operate a program in which students and teachers would be trained to monitor water quality in Bainbridge Island's streams and watersheds.²⁴

San Francisco Bay

EPA approved the management plan for San Francisco Bay in 1993. The San Francisco Estuary Project, a state agency under the California Water Resources Control Board, is coordinating its implementation. Examples of priority problems and corrective actions include: restoring wetlands, managing water supplies, disposing of sediments, and monitoring water quality.²⁵

Restoring Wetlands. Some of the actions recommended in the management plan to restore and protect wetlands are complete. The Bay Area Wetlands Ecosystem Goals Project is conducting a scientific study that would determine the types and quantities of wetlands necessary to sustain the estuary's health, and the San Francisco Estuary Project reports that it has supported the restoration or enhancement of over 8,000 acres of wetlands. In addition, the state of California has adopted a no-net-loss policy for land development affecting wetlands, and the state's San Francisco Bay Conservation and Development Commission has hired additional staff to monitor illegal activities that fill in wetlands.

Managing Water Supplies. In 1995, the U.S. Bureau of Reclamation and 15 local water agencies in the San Francisco Bay area collaborated to conduct the Central California Water Recycling Project, which studied opportunities for water recycling on a regional basis. The study estimated that 650,000 acre feet of water could be recycled each year by 2020. Many municipalities have begun to operate

²² Ibid., p. 55.

²³ Ibid., p. 61.

²⁴ Puget Sound Water Quality Action Team home page [http://www.wa.gov/puget_sound]

²⁵ San Francisco Estuary Project. Comprehensive Conservation and Management Plan for the Bay-Delta: Implementation Progress 1993-1996. October 1996. p. 1-5.

water recycling programs and are currently recycling 90,000 acre feet of water annually. Also, the California Department of Water Resources and the U.S. Bureau of Reclamation are jointly funding a project to research irrigation practices that would promote greater efficiency in agricultural uses of water supplies.

Disposing of Sediments. The Long Term Management Strategy (LTMS) for disposing of dredged materials, a private/public cooperative effort, has released a draft report that proposes options for disposing of sediments over the next 50 years. This report fulfills an element of the management plan that recommends the development of such options to address problems with accumulated sediments in San Francisco Bay. The LTMS has assessed future dredging needs, developed ways to reduce unnecessary dredging, examined federal and state policies for consistency, and identified 17 sites where sediments could be reused. Since the LTMS is a public/private endeavor, the pursuit of these disposal options will depend on the commitment and resources of the strategy's developers. In addition, state regulatory measures have helped to increase the reuse of dredged material for wetlands restoration, landfill cover, beach enhancement, and road construction.

Monitoring Water Quality. The San Francisco Estuary Institute, a state agency under the California Water Resources Control Board, administers the Regional Monitoring Program (RMP) to collect data on pollutants, water quality, human uses, and aquatic populations. The RMP has tracked trace substances in San Francisco Bay and its tributaries for the past 4 years to help scientists accurately identify continuing pollution problems. At the federal level, NOAA is monitoring the effect of diverting freshwater on salinity levels.

Albemarle-Pamlico Sound

EPA approved the management plan for Albemarle-Pamlico Sound in November 1994. The Division of Water Quality (DWQ) in North Carolina's Department of Environment, Health, and Natural Resources is coordinating its implementation.²⁶ Examples of priority problems and corrective actions include: setting daily limits on discharges of pollutants, controlling agricultural runoff, managing wastewater, and restoring habitats.

Setting Daily Limits on Discharges of Pollutants. The DWQ has established total maximum daily loads (TMDLs) that specify the amount of pollution that can enter Albemarle-Pamlico Sound without threatening water quality.²⁷ The DWQ completes a TMDL for each industrial facility and wastewater treatment plant before granting a water discharge permit. As of August 1996, the DWQ had completed approximately 2,000 TMDLs in the process of awarding these permits. The DWQ also has developed a water quality management plan that establishes TMDLs for each river basin draining into the estuary.

²⁶ North Carolina Department of Environment, Health, and Natural Resources. Division of Water Quality. Implementation of the Comprehensive Conservation and Management Plan: Summary Report. August 1996. p. i.

²⁷ Ibid., p. 2-3.

Controlling Agricultural Runoff. The North Carolina General Assembly has expanded the state's Agriculture Cost Share Program to offer greater economic incentives to farmers for controlling pollution from agricultural runoff.²⁸ The Assembly has increased funding for the Neuse River basin by \$1,750,000 and provided an additional \$5,750,000 for the remaining river basins. The state also has hired additional personnel to provide farmers with technical assistance in developing measures to reduce pollution in runoff from their lands.

Managing Wastewater. The DWQ has increased its coordination with the state's Office of Waste Reduction (OWR) to lower pollution discharged from industrial facilities and municipal wastewater treatment plants.²⁹ The OWR's Prevention Program provides technical assistance to industry, and the Pretreatment Program assists municipalities in controlling their wastewater more effectively. Both programs are voluntary and seek to encourage prevention and pretreatment at facilities and plants that are experiencing difficulty in complying with state water quality standards. All of North Carolina's major municipal wastewater treatment plants are currently participating in the Pretreatment Program.

Restoring Habitats. Federal and state agencies are collaborating to restore habitats necessary for protecting fishery and other wildlife populations in Albemarle-Pamlico Sound. The DWQ is coordinating a project funded by a federal grant from NOAA's Coastal America program to remove two dams on the Neuse River in Wayne County, North Carolina.³⁰ The state claims that these dams have interrupted the free-flowing character of the river and prevented anadromous fish from migrating upstream during their spawning season. Removing the dams would reopen spawning habitats on 140 miles of upriver streams.

Long Island Sound

EPA approved the management plan for Long Island Sound in September 1994, and the Long Island Sound Study is coordinating its implementation. The study is a joint effort between the states of Connecticut and New York and EPA's Regions 1 and 2. Examples of priority problems and corrective actions include: lowering inputs of nitrogen, reducing pathogens, managing toxic substances, and cleaning up floating debris.³¹

Lowering Inputs of Nitrogen. The management plan for Long Island Sound identified eutrophication due to excessive levels of nitrogen as one of the estuary's most threatening water quality problems and recommended freezing inputs of nitrogen at 1990 levels to prevent further water quality degradation. Improvements in treating wastewater and preventing overflows at many plants have reduced daily nitrogen loads by 5,000 pounds below what they were in 1990. All of the sewage treatment plants in Connecticut and Westchester, Nassau, and Suffolk Counties in New York

²⁸ Ibid., p. 8.

²⁹ Ibid., p. 17.

³⁰ Ibid., p. 30-31.

³¹ Long Island Sound Study. Putting the Plan in Motion. 4 p.

have achieved “no net increases” in nitrogen levels, and other plants are in the process of making improvements. At the state level, Connecticut and New York have increased funding for projects that lower releases of nitrogen into the sound.

Reducing Pathogens. The states of Connecticut and New York have prohibited commercial shellfishing in some areas of Long Island Sound and closed many of the beaches due to public health risks from pathogen contamination. In Connecticut, the cities of Bridgeport, New Haven, Middletown, and Hartford have begun long-term projects to prevent releases of pathogens from combined sewer overflows, and New York City’s comprehensive sewer abatement program is scheduled for completion in 2006. The states of Connecticut and New York are developing programs to educate boaters and swimmers about the health risks associated with discharging human waste into waterways, and numerous marinas are planning to construct new or renovate existing pump out facilities for boaters to dispose of wastes safely.

Managing Toxic Substances. The state of Connecticut has funded research to assess the level of toxic substances in Long Island Sound and recommend restorative actions to reduce their impacts on water quality. The state also has completed pollution prevention site assessments at 33 industrial facilities and recommended measures to reduce discharges of toxic substances. One program to pre-treat industrial wastewater before it is discharged has helped to reduce the amount of metals released into Long Island Sound by 1,000 pounds per day. In addition, a toxicity survey of 20 harbors and bays is complete and will be used to develop effective ways to manage sediments contaminated with toxic substances.

Cleaning Up Floating Debris. According to the Long Island Sound Study, discharges from combined sewer overflows and stormwater drains are responsible for a large portion of floating trash and other debris across the estuary. To raise public awareness about pathways through which trash can enter local waterways, over 16,000 storm drains are painted with an environmental warning, *Don’t Dump—Drains into Long Island Sound*, and in New York alone, over 3,000 storm drains are painted with a bilingual environmental warning in English and Spanish, *Clean Streets—Clean Beaches*. In 1995, nearly 900 volunteers removed over 7,000 pounds of trash from 30 miles of shoreline in New York, and over 700 volunteers removed over 4,000 pounds of trash from 23 miles of shoreline in Connecticut.

Conclusion

The majority of federal programs to protect water quality rely on conventional regulatory measures that control specific sources of pollution uniformly on a national level. However, the National Estuary Program departs from this traditional strategy to control pollution through incorporating a watershed approach in which all affected interests participate in tailoring solutions to environmental problems for a specific geographic area. This approach can offer greater opportunities for state and local governments, industry, and citizens to participate in addressing the environmental problems that directly affect their communities and can provide increased flexibility in deciding which measures are better suited for their localities. However, developing solutions collaboratively can require significantly more time than instituting

conventional regulatory measures, and the financial resources to implement collaborative solutions depend on the availability of funds from a multitude of public and private sources.

To date, EPA has approved the management plans for 22 of the 28 estuaries in the National Estuary Program. While they have taken numerous actions to address the priority problems identified in their management plans, some of the most common sources of pollution are indirect and difficult to control, including runoff from agricultural land and urban streets, overflows from wastewater treatment plants, air pollution deposited into waterways by rainfall, and releases of waste from boaters and swimmers. Under the National Estuary Program's collaborative approach, reducing pollution from these diffuse sources depends in part on whether coastal populations are committed to altering established patterns of land use, management of water supplies, and individual behavior to solve environmental problems in their communities. So far, the National Estuary Program has made progress in educating the public about environmental problems, fostering better management of water resources, reducing pollution, and restoring habitats at certain estuaries. However, the long-term success of the program depends on the continued commitment, participation, and resources of the stakeholders in each locality.

Selected References

Clean Water Act Reauthorization. by Claudia Copeland. CRS Issue Brief IB10001.
Updated regularly.

Environmental Protection Agency. National Estuary Program Home Page.
[<http://www.epa.gov/nep>].

Wetland Issues. by Jeffrey A. Zinn and Claudia Copeland. CRS Issue Brief IB97014.
Updated regularly.